A Synopsis of the Lead Program at Weston Elementary School in the City of Winnipeg

Terrestrial Standards and Studies, Report #85-3

Manitoba
Environment and
Workplace Safety
and Health

A SYNOPSIS OF THE LEAD PROGRAM AT WESTON ELEMENTARY SCHOOL IN THE CITY OF WINNIPEG

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Report #85-3
March, 1985

Jones, D. C. 1985. A synopsis of the Lead Program at Weston Elementary School in the City of Winnipeg. Department of Environment and Workplace Safety and Health, Terrestrial Standards and Studies Section. Report #85 - 3.21pp.

ABSTRACT

For residential areas or other areas frequented by children the Department of Environment and Workplace Safety and Health recommends the removal and or replacement of soils having lead levels in excess of 2600 µg/g. At Weston Elementary School lead levels in excess of this guideline were determined for the period 1981 through 1983. This report provides a background of the lead problem at Weston School and an outline of the resultant cleanup operations in 1981 and 1983. In addition, a description of the monitoring and special investigations undertaken by the Environmental Management Division is given. Remedial action taken by the Winnipeg School Division at Weston School in 1984 is presented. A recommendation for further investigation into the contribution of auto exhaust to lead deposition in urban soils is made.

TABLE OF CONTENTS

	PAGE
ABSTRACT	i
TABLE OF CONTENTS	ii
1. BACKGROUND	1
2. LEAD IN SOIL CLEANUP	3
2.1 Initial Cleanup, 1981	3
2.2 Second Cleanup, 1983	4
3. SUPPLEMENTARY INVESTIGATIONS AND MONITORING	5
4. REMEDIAL ACTION, WESTON SCHOOL, 1984	6
5. FUTURE MONITORING AT WESTON SCHOOL	7
REFERENCES	8
APPENDICES	9
APPENDIX 1. Map of Weston School	10
APPENDIX 2. 1981 Cleanup contract awarded to Power Vac Services	11
APPENDIX 3. Table of lead-in-soil levels for the period April, 1982-May, 1983	16
APPENDIX 4. 1983 cleanup contract awarded to Power Vac Services	17
APPENDIX 5. Table of lead-in-air concentrations for Weston School, 1984	21

1. BACKGROUND

In 1976 and in 1979 elevated blood lead levels were found in some of the children attending Weston and Lord Nelson Elementary Schools, in Winnipeg. The Canadian Bronze Company, a secondary lead smelter, is located in close proximity to Weston School. Elevated blood lead levels were also found in some of the workers at the smelter.

It was suspected that these elevated blood lead readings may have been caused by high ambient lead-in-air levels in the vicinity of Canadian Bronze. There was also concern that the other two secondary smelters in Winnipeg might be emitting environmentally hazardous quantities of lead. During the summer of 1979 the Environmental Management Division conducted an ambient air survey as well as a survey of lead in tree foliage and surface soils in the vicinity of the three secondary lead smelters and at Weston and Lord Nelson Schools (Wotton 1979, 1980 and Bezak 1979). The air surveys reported lead-in-air levels in excess of the Manitoba Air Quality Guideline of 5 $\mu g/m^3$ of lead, averaged over 24 hours, for both Canada Metal and North West Smelting and Refining Ltd. However, the ambient lead concentrations near Canadian Bronze were within the guideline. The soil and vegetation survey reported high levels of lead-in-soil around Weston and Lord Nelson Schools, and a gradient of decreasing concentration away from the smelter. Lead concentrations in tree foliage and surface soils sampled close to the lead smelters were frequently ten times higher than levels found at background sites in other areas of Winnipeg.

In order to address the health concerns of the residents of the Weston community,public meetings were held at Weston School on November 7, 1979 and February 13, 1980. Following the meeting of February 13 the Minister responsible for the Environment requested further detailed lead surveys in the Weston area to ascertain the source of the lead and the extent of contamination.

During March 1980, consultations were carried out with representatives of the Ontario Ministry of the Environment to obtain information on past and current programs involving lead emissions from industrial and automobile sources with particular emphasis on the soil removal/replacement program carried out in Metropolitan Toronto in 1977 (Wotton 1981a). Following these consultations the Division adopted the Ontario Ministry of Environment guideline for lead-in-soil. This guideline specifies that lead-in-soil for residential areas or areas frequented by children should not exceed 2600 µg/g. Soils exceeding this guideline should be removed and or replaced.

Additional lead-in-air and lead-in-soils and vegetation surveys were conducted during the summer of 1980 at Weston and Lord Nelson Schools and in the immediate vicinity of the three secondary lead smelters (Wotton and Bezak 1980). The air monitoring results were similar to those found in 1979. The soils and vegetation survey found a gradient of lead accumulation decreasing sharply with increasing distance from high traffic volume streets. Lead accumulation levels were similar to those found in 1979.

Canadian Bronze is the only one of three secondary lead smelters located in a residential area but more importantly, is located in close proximity to Weston Elementary School. To further evaluate the extent of and level of contamination in the area surrounding the smelter an intensive soil survey was carried out in April, 1981 (Wotton 1981b). This survey delineated areas where there was a higher probability that children might be exposed to unacceptable lead-in-soil levels. Sixty-eight residences, 1400 meters of boulevard and the playgrounds of Weston School were singled out for further intensive study. Another survey was carried out in July, 1981 and the report that followed recommended that particulate debris with lead levels in excess of the guideline should be removed from the paved play area at the north side of Weston School (Wotton 1981c).

An outline of the initial cleanup procedure and a subsequent cleanup in June, 1983 are presented. This report also describes the special monitoring and investigations undertaken, the remedial program implemented at Weston School and future monitoring activities planned.

2. LEAD IN SOIL CLEANUP

2.1 Initial Cleanup - 1981

Samples of surface particulate material, taken during the July, 1981 survey from the paved play area at Weston School, had an average concentration of 4,850 µg/g of lead (Wotton 1981c). Because

these lead levels were in excess of the 2600 µg/g guideline, a contract was awarded to Power Vac Services of Winnipeg to carry out a cleanup of the affected area (Appendix 1 and Appendix 2). Using a dry vacuuming procedure assisted by manual soil loosening, approximately 1.0 tonne of debris was removed and disposed of at the City of Winnipeg, Brady Street landfill site. The cleanup operation was completed on August 24 and 25, 1981 at a cost of $2600. The cost of the cleanup was assumed by the Province. Environmental Management Division staff supervised the cleanup.

2.2 Second Cleanup - 1983

Following the initial cleanup operation in August, 1981 the Division continued to monitor the levels of lead at Weston School. Samples taken in April, May and September, 1982 and May 1983 indicated that lead levels in newly accumulated migrant dust were again above the guideline (Appendix 3).

As a result of these findings a second contract was awarded to Power Vac Services of Winnipeg to carry out another cleanup operation (Appendix 4). The cleanup was completed on June 4, 1983 at a cost of $1700. The cost of the cleanup was again assumed by the Province. Approximately 1.36 tonnes of debris were recovered and disposed of at the Brady Street landfill site. Environmental Management Division staff supervised the operation.

3. SUPPLEMENTARY INVESTIGATIONS AND MONITORING

In 1982 the Environmental Management Division entered into a co-operative lead research project with the Atomic Energy of Canada Limited at Pinawa and the Canadian Bronze Company Ltd. of Winnipeg. The purpose of the project was to investigate the characterization or fingerprinting of individual lead particles originating from known sources of lead in Winnipeg. A report "Lead Particulate Analysis in Air and Soil of the City of Winnipeg, 1982" was released by the Department of Environment and Workplace Safety and Health on June 1, 1983 (Wotton and Doern 1982). One major conclusion of the report was that automobile exhaust from Logan Avenue, a major traffic artery, appeared to be the primary source of lead at Weston Elementary School. The report also speculated that levels of lead at other schools might also be elevated due to automobile exhaust emissions.

As a result of these findings the Division expanded the lead monitoring program to sample and analyze surface soil debris at seven other Winnipeg schools. The report "A Survey of Lead in Soil from Seven Schools and Three Residential Areas of Winnipeg, 1983" was released in January, 1984 (Jones and Wotton 1983). Lead levels at the schools were consistently within the 2600 µg/g guideline. It appears that Weston School has a unique problem with respect to lead, but the reason for this is not known. It is suspected that paint chips containing high levels of lead may be contributing to the

elevated lead levels found at Weston School. The report recommended remedial action which could be taken to minimize the accumulation of lead contaminated particulate debris on paved school play areas.

In April, 1984, the Air Standards and Studies Section initiated monitoring of lead-in-air at street level at Weston School (Appendix 1). Air quality monitoring in the past was carried out using a sampler located on the roof of Weston School. Although data from April to October, 1984 indicated higher particulate and lead levels than were previously determined with the rooftop sampler, they were still well within the Manitoba Air Quality Guideline for lead (Appendix 5).

4. REMEDIAL ACTION, WESTON SCHOOL, 1984

During the summer of 1984 the Winnipeg School Division initiated remedial action to minimize the exposure of school children to lead at Weston School. To reduce the lead contribution due to sloughing of high lead paint, all painted surfaces on the north and west side of the school were scraped and repainted. In September the entire frontal paved area adjacent to Logan Avenue as well as the paved west side along Quelch Street was removed and replaced with new soil and sod; shrubbery and trees were planted. The objectives of the program to replace the paved play area with a landscaped area were: a) to remove concern for the old play area and prevent the children from playing in an area of potential risk from lead exposure and b) to provide a physical trap for lead bearing particulates.

5. FUTURE MONITORING AT WESTON SCHOOL

The Environmental Management Division had recommended that remedial measures be carried out at Weston School and was pleased with the action taken by the Winnipeg School Division. Environmental Management intends to continue to monitor the levels of lead-in-air as well as in the new sod and soil in order to assess the potential for any health associated risk to the children attending Weston School.

It is recommended that further investigation into the relationship of automobile exhaust emissions to lead levels in soil be undertaken. This would provide a better understanding of the origin of lead in the urban environment.

REFERENCES

Bezak, D. 1979. Ambient Air Lead Survey Around Winnipeg's Secondary Lead Smelters - Summer 1979 in "Lead Program City of Winnipeg Interim Progress Report". Environmental Management Division, Environmental Services Branch, Appendix B1:46-49.

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Wotton, D. L. 1979. A Survey of Lead Accumulation in Tree Foliage and Surface Soil of the Winnipeg Area. Environmental Management Division, Environmental Research and Development Branch, Department of Mines, Natural Resources and Environment, Report 79-4. 32pp.

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Wotton, D. L. 1981b. Soil Survey for Lead Deposition in the City of Winnipeg, Interim Progress Report . Environmental Management Services Branch, Environmental Management Division, Department of Consumer Corporate Affairs and Environment. 5pp.

Wotton, D. L. 1981c. Report on Soil Survey for Lead Deposition in the Area of Weston Elementary School. Environmental Management Services Branch, Environmental Management Division, Department of Consumer and Corporate Affairs and Environment. 7pp.

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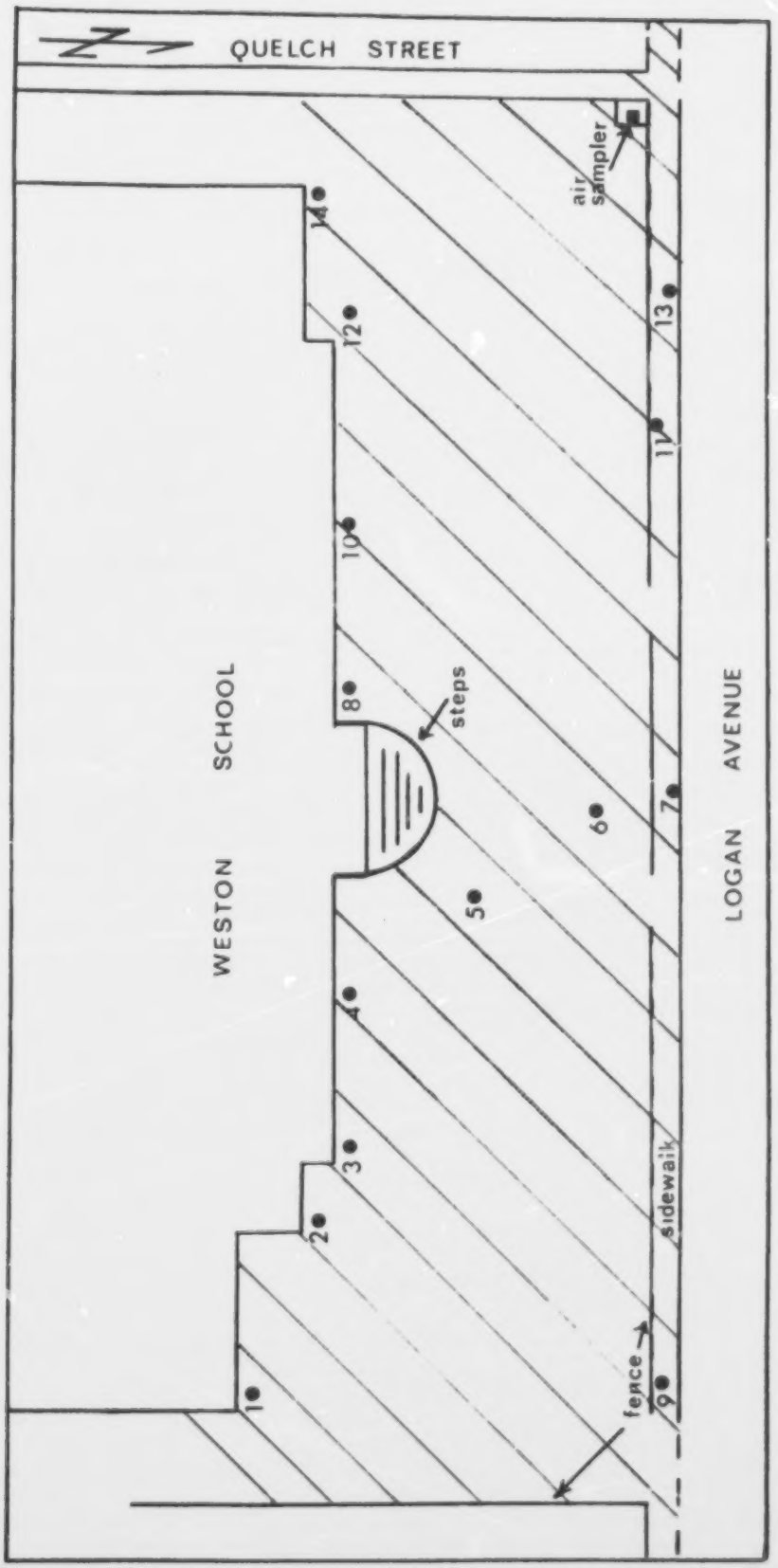
Wotton, D. L. and F. E. Doern. 1982. Lead Particulate Analysis in Air and Soil of the City of Winnipeg, 1982. Environmental Standard and Studies, Terrestrial Standards and Studies, Department of Environment Workplace Safety and Health. Report 82-3. 64pp.

APPENDICES

APPENDIX 1. Map of Weston School



APPENDIX 2. 1981 Cleanup contract awarded to PowerVac Services

MEMORANDUM OF AGREEMENT

THIS AGREEMENT made in duplicate the 20 day of August, A.D., 1981.

BETWEEN: KAYJAY INVESTMENTS LTD. carrying on business under the firm name of POWER VAC SERVICES, Winnipeg,

(hereinafter called the "Contractor"),

OF THE FIRST PART,

- and -

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA through the MINISTER of CONSUMER AND CORPORATE AFFAIRS AND ENVIRONMENT,

(hereinafter referred to as the "MINISTER"),

OF THE SECOND PART,

WHEREAS the Minister has undertaken an intensive lead-in-soil survey within and around the property of Weston Elementary School in Winnipeg and has identified an area with lead levels in excess of the Guideline of 2600 ppm of lead in soil for soil removal/replacement.

AND WHEREAS the Contractor has indicated he will design and operate a specially modified vacuum head that will efficiently remove this material from the contaminated surface.

NOW, THEREFORE, in consideration of the mutual promises hereinafter contained, the Contractor and the Minister agree as follows:

1. The Contractor agrees to perform pursuant to the directions of a designated officer of the

Department of Consumer and Corporate Affairs and Environment a clean-up of contaminated dust, soil and debris of the paved portion approximating a 35 foot by 300 foot strip in the vicinity of the north side of the Weston Elementary School building, 1410 Logan Avenue, Winnipeg, Manitoba as shown colored in red in the diagram attached hereto as Schedule A according to the following guidelines:

a) The Contractor will manually loosen all accumulated dust and particulate matter at all locations designated for removal.

b) The Contractor will dry vacuum the material immediately after manual loosening by use of a specifically designed vacuum head with a large force vacuum system.

c) The Contractor will provide adequate protection to his employees during the physical removal operation by the use of dust aspirators and protection clothing as required.

2. The Contractor agrees to dispose of the collected material as follows:

a) All collected material is to be carefully transferred under cover to the City of Winnipeg landfill site situated on Brady Street.

b) At this landfill site, all material is to be disposed of in a manner acceptable to hazardous waste management under the direction of a designated officer of the Department of Consumer and Corporate Affairs and Environment.

3. The Minister agrees to have officers of his Department to be present at the clean-up site and to be available to the Contractor to advise of the exact clean-up site area and to determine whether the removal operation has been satisfactorily completed. The criteria to be used for determination of satisfactory clean-up are:

a) A selected portion of the cleaned-up area is to be designated for quality control testing.

b) This area is to be rinsed with a distilled water solution and the rinse water will be analyzed for lead content.

c) If the lead levels exceed 2600 ppm or it's equivalent in the test water, all clean-up procedures are to be re-implemented by the Contractor until lead levels are found to be below the acceptable level of 2600 ppm.

4. The Contractor agrees to take all reasonable and necessary steps to facilitate the performance of the clean-up for successful completion by August 31, 1981 A.D. There shall be no work performed after August 31, 1981 without permission of the Winnipeg School Division #1.

5. The Minister shall pay to the Contractor on successful completion of the clean-up procedure as defined in Clause 3 a sum of two thousand and six hundred (2600) dollars for services rendered.

6. The Contractor undertakes to save harmless and agrees to indemnify the Minister against all action, damages, claims and demands which may arise out of the performance of the Contractor of his duties under this agreement.

IN WITNESS WHEREOF the parties hereto have hereunto set their hands as of the day and year first above written.

SIGNED, SEALED AND DELIVERED)
in the presence of:)

WITNESS

KAYJAY INVESTMENTS LTD.
Aug 20, 1981

WITNESS

MINISTER OF CONSUMER AND
CORPORATE AFFAIRS AND ENVIRONMENT

APPENDIX 3: Table of lead-in-soil levels for the period April, 1982 to May, 1983 at Weston School

Sample Site	Lead Concentration in Soil Material (µg/g)			
	April 7/82	May 19/82	Sept. 16/82	May 19/83
1	3,000	2,800	2,400	2,200
2	4,600	4,400	3,000	3,300
3	3,600	4,300	3,200	3,200
4	5,500	5,400	3,800	3,200
5	4,700	3,800	3,800	3,800
6	3,000	6,000	2,700	2,300
7	950	2,300	3,300	2,300
8	4,800	2,900	2,400	2,500
9	2,200	-	1,900	1,400
10	4,000	3,200	3,500	4,800
11	1,800	3,800	3,600	3,800
12	4,000	2,000	3,300	2,800
13	3,100	2,000	2,400	1,500
14	4,000	3,000	5,600	2,500
Mean Conc.	3,518	3,530	3,207	2,829

Manitoba Environment guideline is 2600 µg/g

APPENDIX 4. 1983 cleanup contract awarded to PowerVac Services

MEMORANDUM OF AGREEMENT

THIS AGREEMENT made in duplicate the 1ST day of June, A.D., 1983.

BETWEEN: G. AND B. ENTERPRISES LTD. carrying on business under the firm name of POWER VAC SERVICES, Winnipeg,

(hereinafter called the "Contractor"),

OF THE FIRST PART,

- and -

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA through the MINISTER OF ENVIRONMENT AND WORKPLACE SAFETY AND HEALTH.

(hereinafter referred to as the "MINISTER"),

OF THE SECOND PART,

WHEREAS the Minister has undertaken an intensive lead-in-soil survey within and around the property of Weston Elementary School in Winnipeg and has identified an area with lead levels in excess of the guideline of 2600 ppm of lead in soil for soil removal/replacement.

AND WHEREAS the Contractor has indicated he will operate a high volume vacuum head that will efficiently remove this material from the contaminated surface.

NOW, THEREFORE, in consideration of the mutual promises hereinafter contained, the Contractor and the Minister agree as follows:

1. The Contractor agrees to perform pursuant to the directions of a designated officer of the Department of Environment and Workplace Safety and Health a clean-up of contaminated dust, soil and debris of the paved portion approximating a 35 foot by 300 foot strip in the vicinity of the north side of the Weston Elementary School building, 1410 Logan Avenue, Winnipeg, Manitoba, as shown colored in red in the diagram attached hereto as Schedule A according to the following guidelines;

   a) The Contractor will manually loosen all accumulated dust and particulate matter at all locations designated for removal.

   b) The Contractor will dry vacuum the material immediately after manual loosening by use of a vacuum head and high volume vacuum system.

   c) The Contractor will provide protection to his employees during the physical removal operation by the use of dust aspirators and protective clothing as required.

2. The Contractor agrees to dispose of the collected material as follows:

   a) All collected material is to be carefully transferred, under cover,

to the City of Winnipeg landfill site situated on Brady Street.

b) At this landfill site, all material is to be disposed of in a manner acceptable to the designated officer of the Department of Environment and Workplace Safety and Health.

3. The Minister agrees to have an officer of his Department to be present at the clean-up site and to be available to the Contractor to advise of the exact clean-up site area and to determine whether the removal operation has been satisfactorily completed.

4. The Contractor agrees to take all reasonable and necessary steps to facilitate the performance of the clean-up for successful completion between June 4, 1983 and June 19, 1983 A.D. The work shall be performed during off school hours at a time specified by the Department between the dates of June 4, 1983 and June 19, 1983 A.D

5. The Minister shall pay to the Contractor on successful completion of the clean-up procedure as defined in Clause 3 a sum of Fifteen Hundred dollars and additional costs incurred for increasing insurance liability from Two Million to Five Million dollars as supported by an invoice from the insurance company.

6. The Contractor undertakes to save harmless and agrees to indemnify the Minister against all action, damages, claims and demands which may arise out of the performance of the Contractor of his duties under this agreement.

7. The Contractor provides proof of third party liability insurance of at least $5,000,000 with the Province of Manitoba, City of Winnipeg and Winnipeg School Division # 1 as named insured. Such policy to contain a cross-liability clause. The policy shall provide for at least 10 days notice to each named insured before cancellation.

IN WITNESS WHEREOF the parties hereto have hereunto set their hands as of the day and year first above written.

SIGNED, SEALED AND DELIVERED)
in the presence of:)

WITNESS

G. AND B. ENTERPRISES LTD.

DATE: June 2/03

WITNESS

MINISTER OF ENVIRONMENT AND WORKPLACE SAFETY AND HEALTH

APPENDIX 5: Table of lead-in-air concentrations for Weston School, 1984

Month	Lead in Air Concentrations ($\mu g/m^3$)											Mean Conc. ($\mu g/m^3$)
April	1.69	0.43	0.54	0.55	0.92	-	-	-	-	-	-	0.83
May	1.35	0.83	0.63	0.86	0.46	0.42	0.13	0.50	0.51	0.20	-	0.59
June	0.24	1.98	0.49	0.23	0.88	0.26	0.52	0.83	0.81	0.62	-	0.69
July	0.96	0.39	0.55	0.26	1.02	0.65	0.17	1.01	0.23	-	-	0.58
Aug.	1.24	0.37	0.77	1.22	0.93	0.53	0.17	1.08	0.26	0.80	1.06	0.77
Sept.	0.66	0.77	0.59	0.90	0.70	1.29	0.87	1.41	2.08	0.93	-	1.13
Oct.	1.38	1.05	0.57	0.71	1.05	2.00	0.57	1.15	0.37	-	-	0.98

Manitoba Air Quality Guideline is 5 $\mu g/m^3$ lead in air/24 hour average